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NATIONAL DAM INSPECTION PROGRAM. FISHPOND DAM (NDS ID NUMBER PA--ETC(U)
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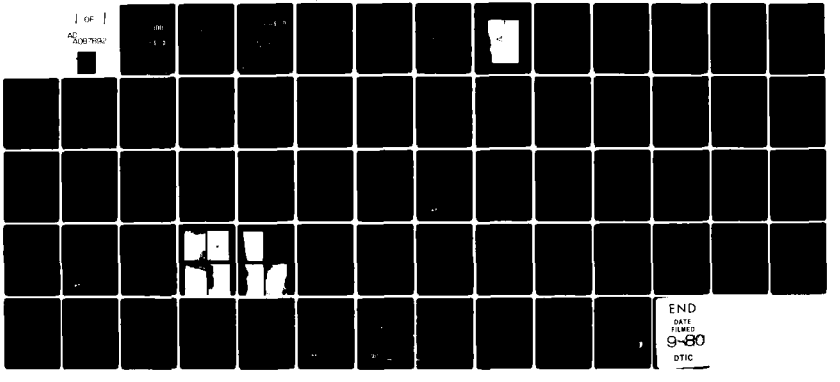

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SUSQUEHANNA RIVER BASIN

UNNAMED TRIBUTARY TO ROARING CREEK, COLUMBIA COUNTY

PENNSYLVANIA

FISHPOND DAM

NDS ID NO. PA-899

DER ID NO. 19-81

LEVEL II

NICHOLAS SPOCK, M.D.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

L. ROBERT KIMBALL & ASSOCIATES
DACW31-80-C-0020

Prepared By

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG, PENNSYLVANIA
15931

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
21203

JUNE, 1980

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UNNAMED TRIBUTARY TO ROARING CREEK, COLUMBIA COUNTY

PENNSYLVANIA

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NICHOLAS SPOCK, M.D.

PHASE I INSPECTION REPORT.

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FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
21203

JUNE 1980

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in detemining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION REPORT

NAME OF DAM	Fishpond Dam
STATE LOCATED	Pennsylvania
COUNTY LOCATED	Columbia
STREAM	Unnamed tributary to Roaring Creek
DATE OF INSPECTION	November 20, 1979 & April 8, 1980

ASSESSMENT

The assessment of Fishpond Dam is based upon visual observations made at the time of inspection, review of available records and data, hydraulic and hydrologic computations and past operational performance.

The inspection and review of data of Fishpond Dam did not reveal any problem which requires emergency action. The dam appears to be in poor condition mainly because of extensive seepage which appears to be increasing. A monitoring program developed by a professional engineer knowledgeable in earth dams should be implemented immediately.

Fishpond Dam is a high hazard-small size dam. The SDF for a dam of this size and classification is 1/2 PMF to PMF. Based on the downstream potential for loss of life and property damage the spillway design flood has been selected as the PMF (Probable Maximum Flood). The spillway and reservoir are capable of controlling the PMF. Based on criteria established by the Corps of Engineers, the spillway is termed adequate.

The following recommendations and remedial measures should be instituted immediately.

1. The seepage and wet areas located on the downstream slope and at the toe of the embankment should be monitored for turbidity and quantity at regular intervals and during periods of heavy precipitation. The monitoring program and the monitoring readings should be evaluated by a professional engineer experienced in dam design and construction. Measures to control seepage should be implemented as required.

2. Raise the height of the earth berm to the right of the emergency spillway to a minimum of top of dam elevation (See page A-12).

3. Provide erosion protection between the emergency spillway and the embankment.

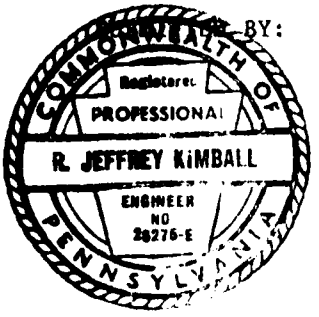
4. Remove the small trees and brush from the spillway exit channel.

5. Repair the separated joints in the principal spillway riser pipe.

6. A warning system should be developed to warn downstream residents of large spillway discharges or imminent failure of the dam.

7. A safety inspection program should be implemented with inspections at regular intervals by qualified personnel.

8. The reservoir drain should be operated and lubricated on a regular basis.



BY: L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS AND ARCHITECTS

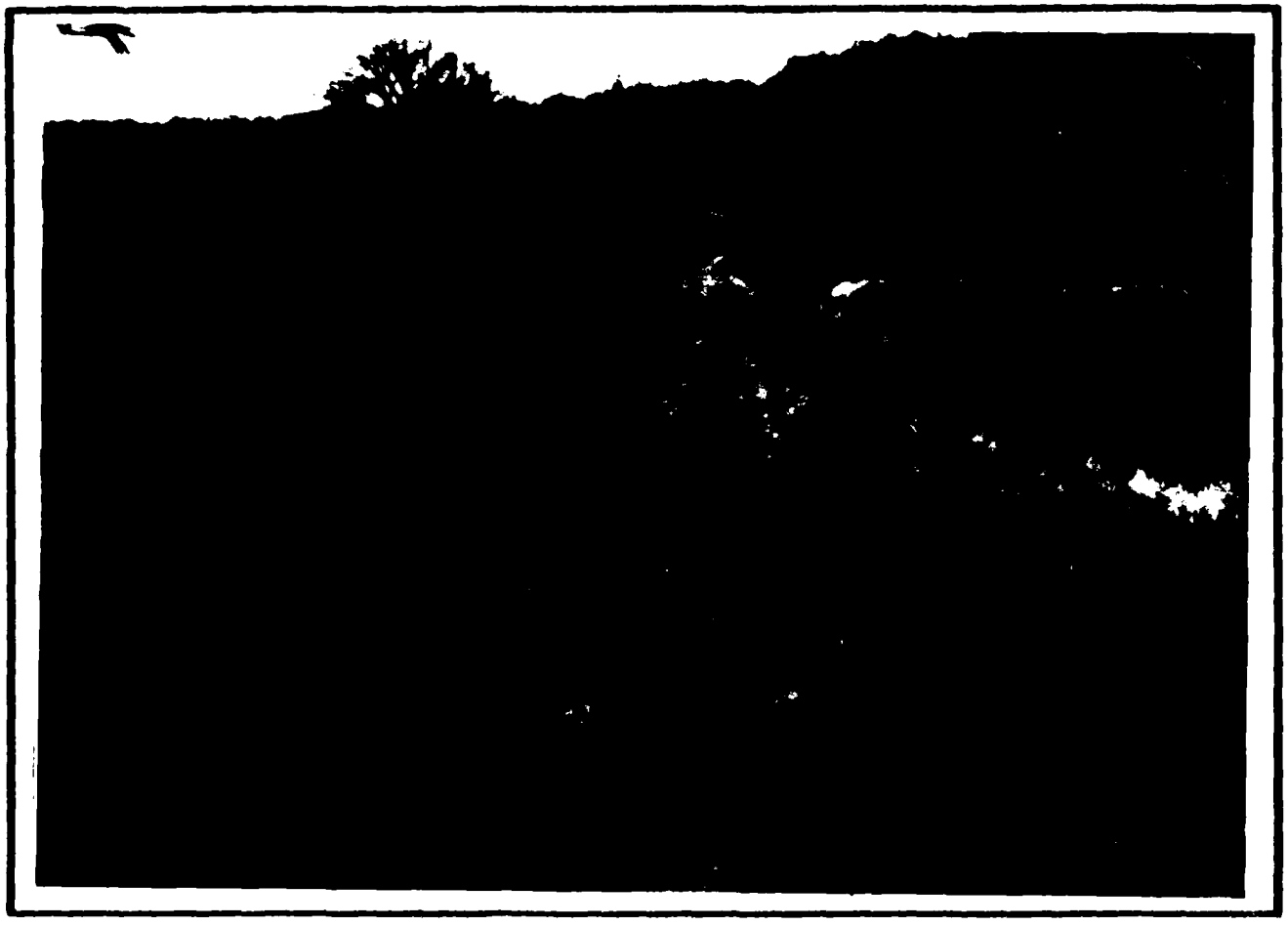
6 July 80 — R. Jeffrey Kimball

Date — R. Jeffrey Kimball, P.E.

APPROVED BY:

11 July 1980 — James W. Peck

Date — JAMES W. PECK
Colonel, Corps of Engineers
District Engineer



Overview of Fish Pond Dam and spillway (foreground).

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PHASE I
NATIONAL DAM INSPECTION PROGRAM
FISHPOND DAM
NDI. I.D. NO. PA 899
DER I.D. NO. 19-81

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Fishpond Dam is an earthfill dam, 39 feet high and 567 feet long. The crest width is 10 feet. The upstream slope is 2H:1V and grass covered. The downstream slope is 2.5H:1V and grass covered.

The principal spillway is a drop inlet structure consisting of a 30" corrugated metal riser and a 24" diameter corrugated metal outlet conduit. The riser is equipped with an anti-vortex device and a trash rack. The outlet conduit has four anti-seep collars. The emergency spillway is a trapezoidal shaped channel with a bottom width of 30 feet. The spillway is located on the left abutment. The control section of the spillway has side slopes of 6H:1V and 1.5H:1V on the left and right side, respectively.

b. Location. The dam is located on an unnamed tributary to Roaring Creek, Columbia County, Pennsylvania. Fishpond Dam can be located on the Shumans, U.S.G.S. 7.5 minute quadrangle.

c. Size Classification. Fishpond Dam is a small size structure (39 feet high, 227 ac-ft).

d. Hazard Classification. Fishpond Dam is a high hazard dam. Downstream conditions indicate that loss of more than a few lives is probable should the structure fail. Several dwellings are located approximately 4,000 feet downstream of the dam.

e. Ownership. Fishpond Dam is owned by Doctor Nicholas Spock. Correspondence should be addressed to:

Nicholas Spock, M.D.
300 North Shamokin Street
Shamokin, PA 17872
(717) 648-2352

f. Purpose of Dam. Fishpond Dam is used for recreation.

g. Design and Construction History. Fishpond Dam was reconstructed in July, 1975, after the original dam failed in June, 1972. No information is available on the original design or construction of the dam. The new structure was built at the same location as the old structure and incorporated portions of the breached dam. The design engineer was Larry Younkin. The contractor was Homer Hayman, Orangeville, Pennsylvania.

h. Normal Operating Procedures. No operations are conducted at the dam. The principal spillway regulates normal flows into the reservoir. The reservoir drainline is reportedly opened once each year. The emergency spillway controls flows during flooding.

1.3 Pertinent Data.

a. Drainage Area. 0.21 square miles

b. Discharge at Dam Site (cfs).

Maximum known flood at dam site	Unknown
Drainline capacity at elevation 1043	48
Spillway capacity at top of dam	540

c. Elevation (U.S.G.S. Datum) (feet). - Field survey based on principal spillway crest elevation 1041.0 contained in design report.

Top of dam - low point	1046.9
Top of dam - design height	1047.0
Maximum pool - design surcharge	1047.0
Normal pool	1041.0
Principal spillway crest	1041.0
Emergency spillway crest (average)	1044.0
Upstream invert - 24" drainline	Unknown
Downstream invert - 24" drainline	1009.9
Streambed at centerline of dam	1008.0
Maximum tailwater	None
Toe of dam	1008.0

d. Reservoir (feet).

Length of maximum pool (PMF)	800 feet
Length of normal pool	700 feet

e. Storage (acre-feet).

Normal pool	170
Top of dam	227

f. Reservoir Surface (acres).

Top of dam	9
Normal pool	8
Spillway crest	8

g. Dam.

Type	Earthfill
Length	567 feet
Height	39 feet
Top width	10 feet
Side slopes - upstream	2H:1V
- downstream	2.5H:1V
Zoning	None
Impervious core	None
Cutoff	None
Grout curtain	None

h. Reservoir Drain.

Type	24" corrugated metal pipe
Length	200 feet
Closure	Gate valve with extension stem to princial spillway entrance
Access	Through principal spillway
Regulating facilities	Valve with extension stem at principal spillway

i. Spillway.

Type	Open cut in earth
Bottom width	30 feet
Crest elevation	1044.0
Upstream channel	Lake
Downstream channel	Open cut trapezoidal in earth

SECTION 2
ENGINEERING DATA

2.1 Design. Review of information in the files of the Commonwealth of Pennsylvania, Department of Environmental Resources revealed that some correspondence, design drawings, design reports and permits were available for review. All of this data was reviewed for this study.

The design report consisted of the normal material expected to be utilized in the process of dam design. The report was in summary form for the most part but some test calculations were available for review. Three (3) triaxial compression tests were made of the proposed embankment material and results were indicated as follows: hole number 1 (C = 18.3 psi, PHI = 5.77°), hole number 2 (C = 1.89 psi, PHI = 2.78°), and hole number 3 (C = 9.6 psi, PHI = 2.83°). The tests were the unconsolidated-undrained type. No indication was given as to the hole location. Test pits were dug as a means of some collection. Test numbers 1 and 2 were remolded specimens and test number 3 was described as relatively undisturbed.

2.2 Construction. Very little information is available on construction of the dam. The design engineer prepared a two page summary of the construction of the dam. No test results are contained in the report.

2.3 Operation. No operating records are maintained.

2.4 Evaluation.

a. Availability. Engineering data were provided by PennDER, Bureau of Dams and Waterways Management. The owner of the dam was interviewed in regards to operation and maintenance of the dam.

b. Adequacy. The amount of design data and other information is substantial. The Phase I report was based on visual inspection and hydrologic and hydraulic analyses. Sufficient information exists to complete a Phase I report.

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. The onsite inspection of Fishpond Dam was conducted by personnel of L. Robert Kimball and Associates on November 20, 1979 and April 8, 1980. The inspection consisted of:

1. Visual inspection of the retaining structure, abutments and toe.
2. Examination of the spillway facilities, exposed portion of any outlet works and other appurtenant works.
3. Observations affecting the runoff potential of the drainage basin.
4. Evaluation of the downstream area hazard potential.

b. Dam. The dam appears to be in poor condition because of the extensive seepage exiting from the toe and right abutment. From a brief survey conducted during the inspection, it was noted that the crest of the dam generally rises towards the right abutment. The crest and upstream and downstream slopes of the dam were covered with grasses. The crest width is 10 feet. The upstream slope was measured at 2H:1V and the downstream slopes at 2.5H:1V. No riprap was placed on the upstream slope.

On November 20, 1979, two seepage areas were noted. The first area was located at the junction of the toe of dam and the right abutment. Seepage exiting from this area was measured at 85 gallons per minute. A second wet area and seepage area was located at approximately 150 feet to the left of the principal spillway discharge. Seepage exiting from this area collects at one location and was measured at 8 gallons per minute (see page A-12). On the second inspection trip to the site on April 8, 1980, the seepage exiting from the right abutment embankment contact area was essentially the same (85 gallons per minute). However, the seepage area 150 feet to the left of the principal spillway discharge was substantially increased from that which was measured on November 20, 1979. This seepage was measured to be 40 gallons per minute. In addition, a concentrated point discharge at the toe of dam was measured to be 15 gallons per minute. This concentrated point discharge was not noted during the earlier inspection. Runoff conditions were regarded as equal during each visit.

c. Appurtenant Structures. The reservoir level at the various times of inspection was approximately 1038.3. A leak

was present at the first joint below the water level in the 30" corrugated metal pipe principal spillway riser. Water entering through this separated joint and the extensive seepage kept the water level in the reservoir below the principal spillway crest. A value exists near the downstream toe which is capable of controlling discharges through the drain.

The emergency spillway consists of an open cut on the left abutment and is trapezoidal in shape. A low spot is present on the earth berm separating the spillway discharge channel from the earth embankment. This low spot on the berm is approximately 1/2 foot lower than the top of dam elevation. During flood flows, overtopping of this earth berm may occur and cause erosion along the embankment abutment contact (See page A-13). No means of erosion protection is present between the spillway and the earth embankment. The spillway discharge channel is trapezoidal in shape and extends beyond the toe of dam.

d. Reservoir Area. The watershed is covered mostly with farmland. The reservoir slopes are gentle to moderate and do not appear to be susceptible to massive landslides which would affect the storage volume of the reservoir or cause overtopping of the dam by displacing water.

e. Downstream Channel. The downstream channel of the unnamed tributary to Roaring Creek is moderately wide.

3.2 Evaluation. The embankment appeared to be in poor condition because of the extensive seepage. The spillway and outlet works appear to be in fair condition.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures. Water level is maintained below the principal spillway crest elevation because of the leak in the principal spillway riser and the extensive seepage through the dam. The reservoir drain was last opened in the summer of 1979.

4.2 Maintenance of the Dam. No planned maintenance schedule exists. No maintenance of the dam is conducted.

4.3 Maintenance of Operating Facilities. The operating facilities are not maintained. The condition of these facilities is considered poor.

4.4 Warning System in Effect. There is no warning system in effect to warn downstream residents of large spillway discharges or imminent failure of the dam.

4.5 Evaluation. The condition of the dam and operating facilities is considered poor. There is no warning system in effect to warn downstream residents.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features.

a. Design Data. The DER files contained the hydrologic and hydraulic design calculations used in the design of these facilities. The SCS method was used to determine the hydrologic characteristics of the dam and watershed. The design calculations and drawings show the emergency spillway length to be 20 feet. However, the as-built width is approximately 30 feet.

b. Experience Data. No rainfall, runoff or reservoir level data were available. The old dam was overtopped in June, 1972 and breached. The dam was rebuilt in 1975. The new spillway has reportly functioned adequately in the past.

c. Visual Observations. The spillway appeared to be in fair condition. A low point on the earth berm separating the spillway and the earth embankment was noted. Flow over this low point would cause some erosion to the right embankment abutment contact of the dam. No erosion protection was provided between the spillway and the dam.

d. Overtopping Potential. Overtopping potential was investigated through the development of the probable maximum flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version systemized computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July, 1978. The major methodologies or key input data for this program are discussed briefly in Appendix D.

5.2 Evaluation Assumptions. To enable us to complete the hydraulic and hydrologic analysis for this structure, it was necessary to make the following assumptions.

1. Pool elevation prior to the storm was at the emergency spillway elevation, 1044.0. Flow through the principal spillway was not considered.

2. The low point on the earth berm separating the dam and the emergency spillway was not considered.

5.3 Summary of Overtopping Analysis. Complete summary sheets for the computer output are presented in Appendix D.

Peak inflow (PMF)	564 cfs
Spillway capacity	540 cfs

a. Spillway Adequacy Rating. The Spillway Design Flood (SDF) for this dam is 1/2 PMF to the PMF. The SDF is based on the hazard and size classification of the dam. Based on the hazard potential for this dam the PMF was selected as the spillway design flood. Based on the following definition provided by the Corps of Engineers, the spillway is rated as adequate as a result of our hydrologic analysis.

Adequate - All high hazard dams which pass the SDF (PMF).

The spillway and reservoir are capable of controlling the PMF without overtopping the dam. However, the earth embankment separating the dam and the spillway would be overtopped by .5 feet. This earth berm should be raised to a minimum elevation of 1047.0.

5.4 Summary of Breach Analysis. As the subject dam can satisfactorily pass the PMF without failure (based on our analysis) it was not necessary to perform the dam breach analysis and downstream routing of the flood wave.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. Minor erosion of the downstream embankment slope was noted during the inspection. Extensive seepage areas were noted during the inspections as noted in Section 3.1b. Two extensive seepage areas were observed. The seepage area 150 feet to the left of the principal spillway discharge pipe increased more than four times between the two inspections. In addition, a concentrated seepage zone was observed during the second inspection (See section 3.1b). An inspection conducted by DER personnel several years ago noted that only one seepage zone was present. Past observations and the fact that seepage increased substantially between our inspections indicates the seepage through this dam may be on the increase even though pool elevations at each inspection appeared equal.

b. Design and Construction Data. Design and construction data is available in the DER files. Stability analyses were conducted for this dam using the design slopes of 3H:1V. The stability analyses conducted for this dam meet the minimum design criteria. However, the as-built slopes are steeper than the designed and analyzed slopes.

c. Operating Records. No operating records are maintained.

d. Post Construction Changes. No post construction changes are known to have occurred since the structure was rebuilt in 1975.

e. Seismic Stability. The dam is located in seismic zone 1. No seismic stability analyses has been performed. Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake loading.

No signs of instability were noted during the inspections. However, long termed stability is questionable due to observed seepage.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The dam appears to be in poor condition mainly because of the extensive seepage which is present and appears to be on the increase. A seepage zone located approximately 150 feet to the left of the principal spillway discharge pipe increased more than four times between our two inspections. This seepage zone plus a seepage zone on the right abutment embankment contact makes a total seepage of approximately 125 gallons per minute. The visual observations, review of available data, hydrologic and hydraulic calculations and past operational performance indicate that Fishpond Dam's spillway is adequate. Some erosion protection should be provided for the emergency spillway. Maintenance and correction of the joint separation in the principal spillway riser should be performed.

b. Adequacy of Information. Sufficient information is available to complete a Phase I report.

c. Urgency. The recommendations suggested below should be implemented immediately.

d. Necessity for Further Investigation. In order to accomplish some of the recommendations/remedial measures outlined below, further investigations will be required.

7.2 Recommendations/Remedial Measures.

1. The seepage and wet areas located on the downstream slope and at the toe of the embankment should be monitored for turbidity and quantity at regular intervals and during periods of heavy precipitation. The monitoring program and the monitoring readings should be evaluated by a professional engineer experienced in dam design and construction. Measures to control seepage should be implemented as required.

2. Raise the height of the earth berm to the right of the emergency spillway to a minimum of top of dam elevation (See page A-12).

3. Provide erosion protection between the emergency spillway and the embankment.

4. Remove the small trees and brush from the spillway exit channel.

5. Repair the separated joints in the principal spillway riser pipe.

6. A warning system should be developed to warn downstream residents of large spillway discharges or imminent failure of the dam.

7. A safety inspection program should be implemented with inspections at regular intervals by qualified personnel.

8. The reservoir drain should be operated and lubricated on a regular basis.

APPENDIX A
CHECKLIST, VISUAL INSPECTION, PHASE I

CHECK LIST
VISUAL INSPECTION
PHASE I

NAME OF DAM Fishpond Dam COUNTY Columbia STATE Pennsylvania ID# PA 899

TYPE OF DAM Earthfill HAZARD CATEGORY High

DATE(s) INSPECTION November 20, 1979
April 8, 1980 WEATHER Clear and warm TEMPERATURE 50°

POOL ELEVATION AT TIME OF INSPECTION 1038.3 M.S.L. TAILWATER AT TIME OF INSPECTION None M.S.L.

INSPECTION PERSONNEL:

R. Jeffrey Kimball, P.E. - L. Robert Kimball and Associates

James T. Hockensmith - L. Robert Kimball and Associates

O.T. McConnell - L. Robert Kimball and Associates

James T. Hockensmith
RECORDER

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Minor erosion on downstream slope.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Several slight bends on horizontal alignment. Low spot on crest near emergency spillway.	
RIPRAP FAILURES	No riprap on upstream slope.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	Grass and brush on slopes. Some brush in emergency spillway exit channel.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appears to be good with the exception of the high rate of seepage exiting from the right abutment.	
ANY NOTICEABLE SEEPAGE	Extensive seepage on the right abutment embankment contact and approximately 150 feet to the left of the emergency spillway discharge channel. Between November 11, 1979 and April 8, 1980, the seepage increased more than 4 times at the seepage to the left of the principal spillway discharge pipe.	
STAFF GAUGE AND RECORDER	None.	
DRAINS	None.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	Not applicable.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Not applicable.	
DRAINS	Not applicable.	
WATER PASSAGES	Not applicable.	
FOUNDATION	Not applicable.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Not applicable.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Not applicable.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Not applicable.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Not applicable.	
RIPRAP FAILURES	Not applicable.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not applicable.	
APPROACH CHANNEL	Not applicable.	
DISCHARGE CHANNEL	Not applicable.	
BRIDGE AND PIERS	Not applicable.	
GATES AND OPERATION EQUIPMENT	Not applicable.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Principal spillway pipe consists of a 24" corrugated metal pipe with a 30" riser. Unobserved except at the ends. First joint is separated below the intake structure on the riser pipe.	
INTAKE STRUCTURE	Concrete appears to be in fair condition.	
OUTLET STRUCTURE	24" corrugated metal pipe. Discharges directly at the toe of dam.	
OUTLET CHANNEL	None.	
EMERGENCY GATE	Not operated during the inspection.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Trapezoidal shaped, open cut in earth. Appears to be in fair condition. Needs riprap on embankment contact. Low spot on earth berm separating the left abutment of the dam and the spillway exit channel.	
APPROACH CHANNEL	Lake.	
DISCHARGE CHANNEL	Trapezoidal shaped, open cut. Several trees in exit channel.	
BRIDGE AND PIERS	None.	

DOWNSTREAM CHANNEL

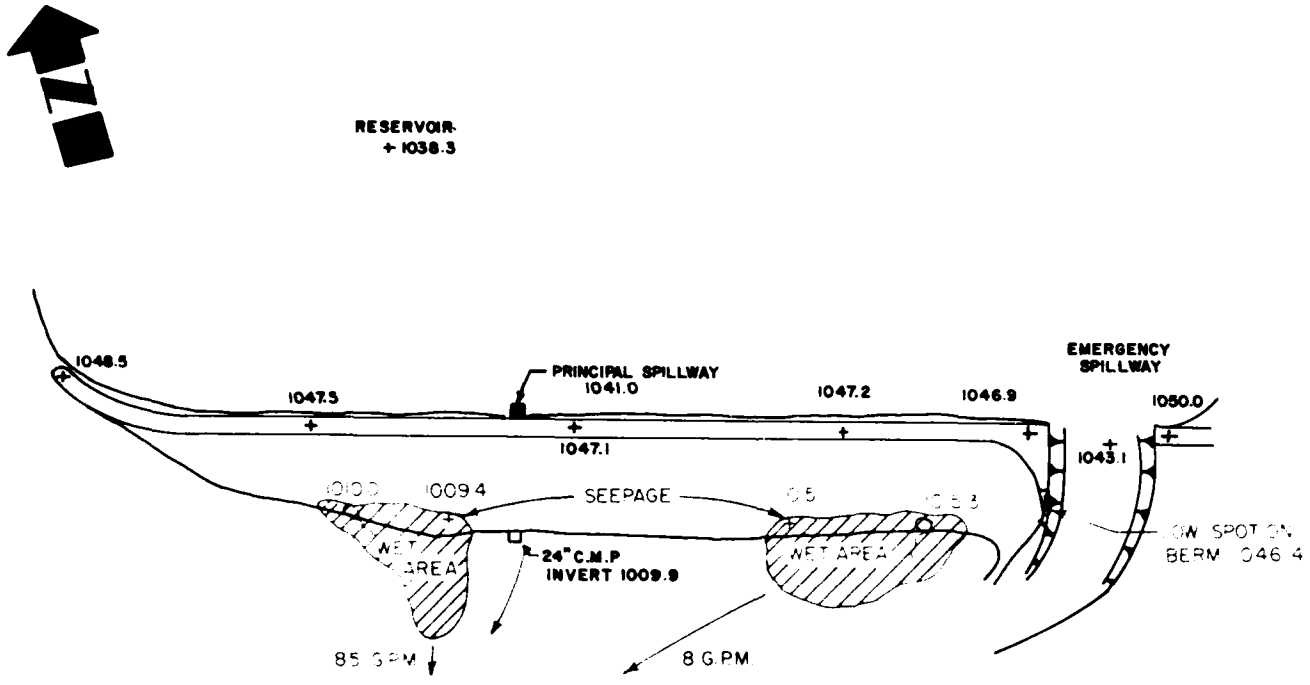
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Narrow channel until unnamed tributary reaches Roaring Creek. Several houses located aproximately 4,000 feet downstream of the dam.	
SLOPES	Appear to be stable.	
APPROXIMATE NO. OF HOMES AND POPULATION	Approximately 3 homes - 15 people within 7,000 feet of the dam.	

RESERVOIR

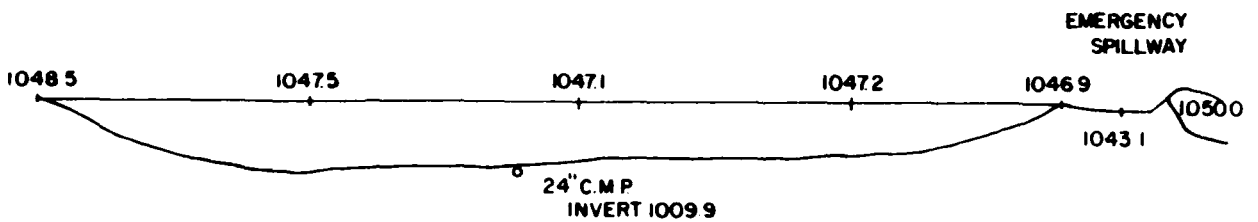
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Gentle slopes. Appear to be stable.	
SEDIMENTATION	Does not appear to be excessive.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	



FISHPOND DAM
Scale 1"=100'



PROFILE
LOOKING UPSTREAM
(SCALE 1" = 100')

FISHPOND DAM

APPENDIX B
CHECKLIST, ENGINEERING DATA, DESIGN, CONSTRUCTION, OPERATION, PHASE I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Fishpond Dam

ID# PA 899

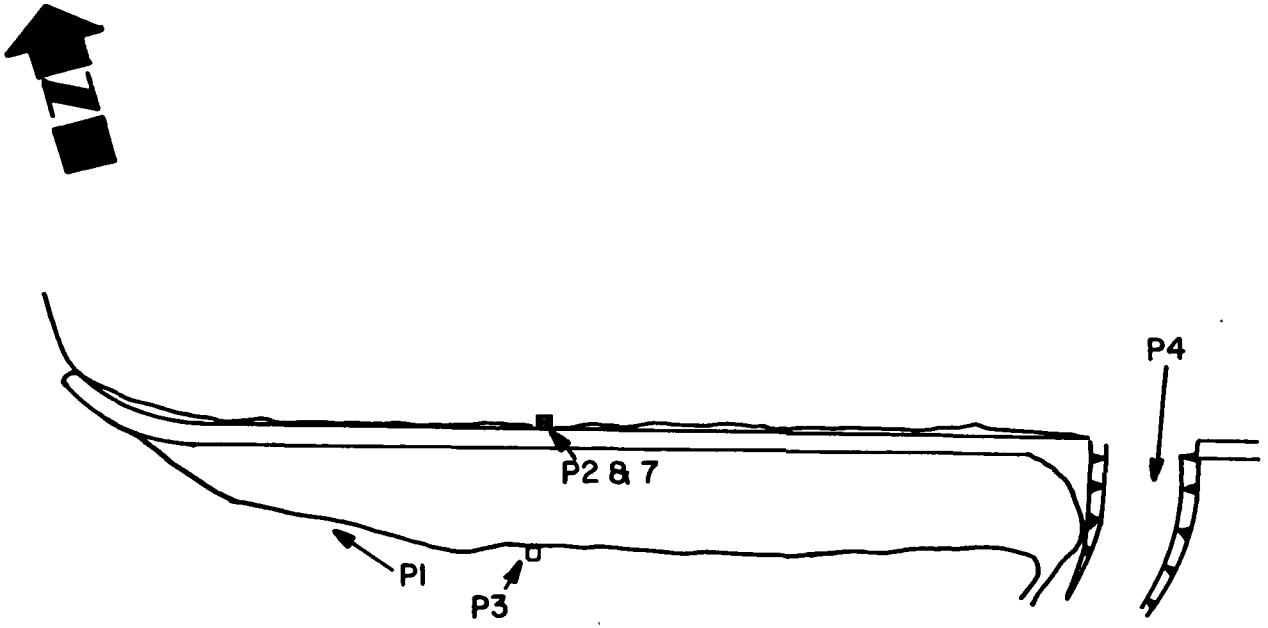
ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. quadrangle.
CONSTRUCTION HISTORY	Brief report in Der files.
TYPICAL SECTIONS OF DAM	On construction drawings.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS RAINFALL/RESERVOIR RECORDS	DER files. DER files. DER files. DER files. None.

ITEM	REMARKS
DESIGN REPORTS	In DER files.
GEOLOGY REPORTS	DER files.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	DER files.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	DER files.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	DER files.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	None since construction in 1975.
HIGH POOL RECORDS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Dam failed in June, 1972, due to overtopping.
MAINTENANCE OPERATION RECORDS	None.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	Construction drawings in DER files.
OPERATING EQUIPMENT PLANS & DETAILS	None.

APPENDIX C
PHOTOGRAPHS



P- INDICATES PHOTO LOCATION

PHOTO INDEX
FISHPOND DAM
SCALE 1"=100'

C-1

FISHPOND DAM

Photo Descriptions

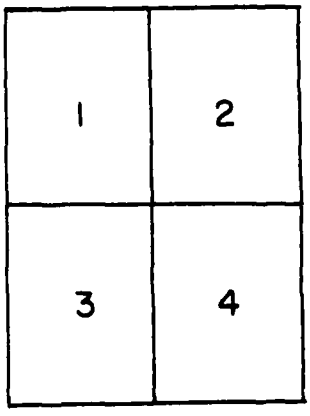
Sheet 1. Front

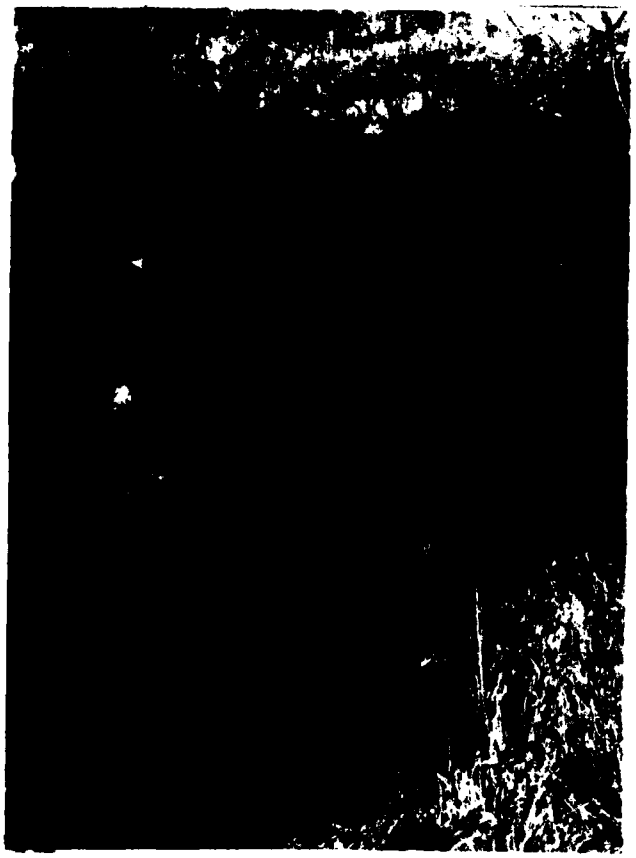
(1) Upper left - Seepage area along right abutment/embankment contact.
(2) Upper right - Intake structure on principal spillway.
(3) Lower left - Principal spillway discharge and seepage areas at toe of dam.
(4) Lower right - Earth spillway control section and discharge channel.

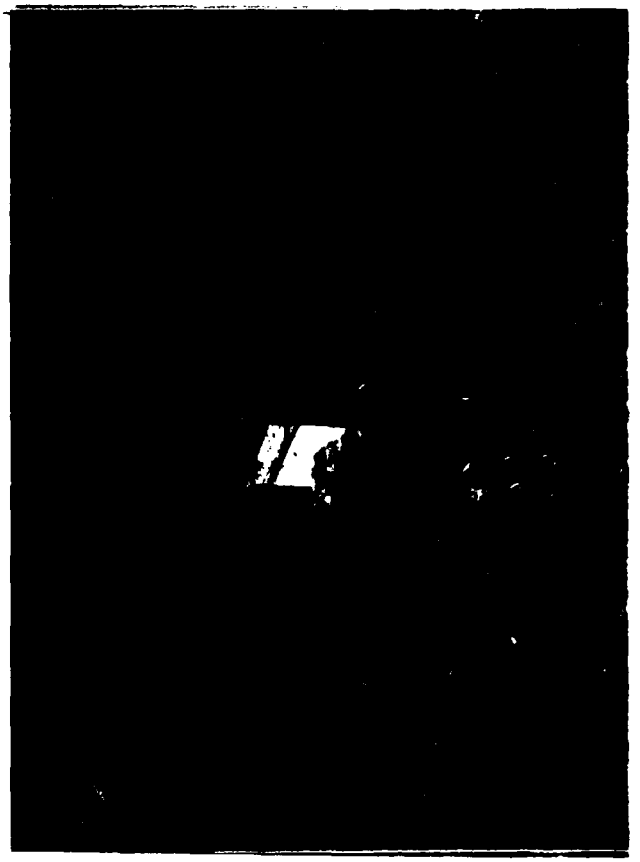
Sheet 1. Back

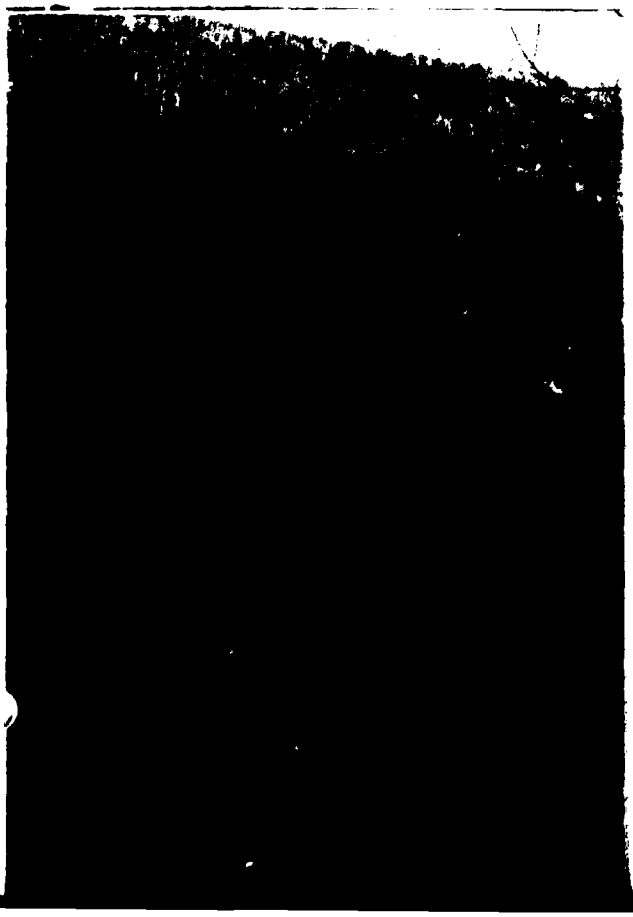
(5) Upper left - Downstream exposure.
(6) Lower left - Downstream exposure.
(7) Lower right - Corrugated metal principal spillway pipe inside intake structure.

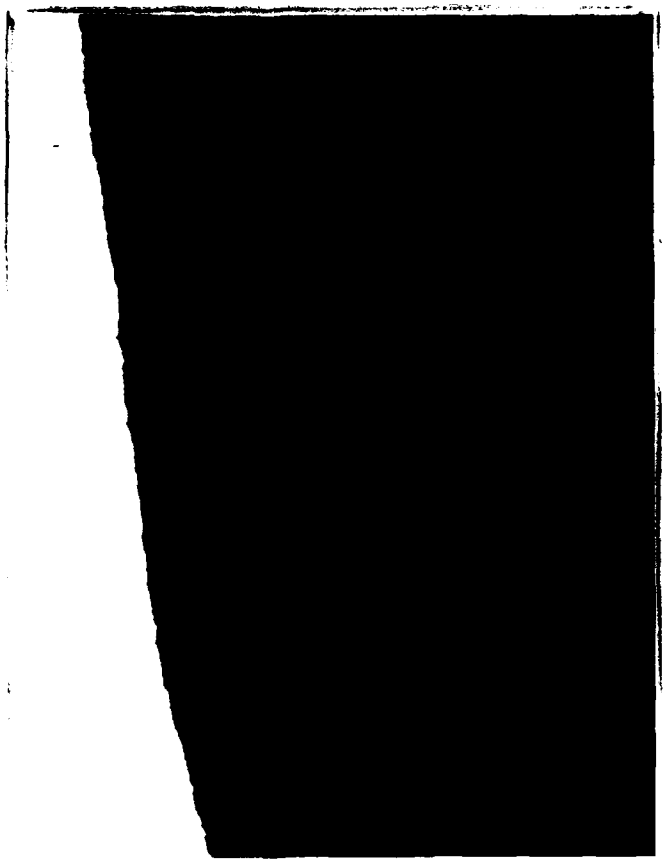
TOP OF PAGE

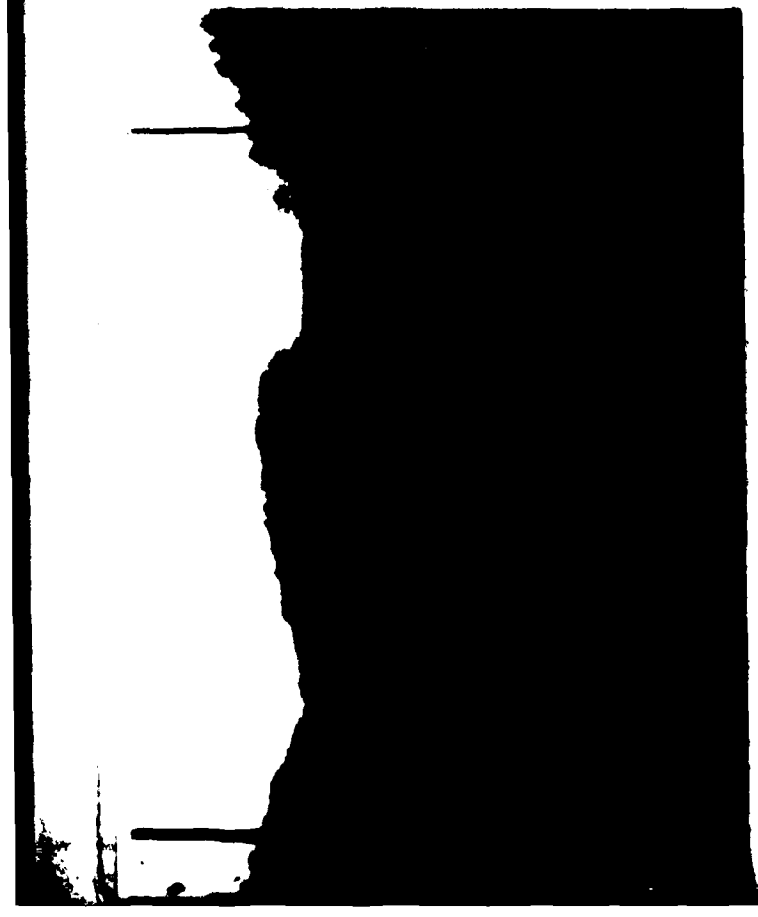












APPENDIX D
HYDROLOGY AND HYDRAULICS

APPENDIX D
HYDROLOGY AND HYDRAULICS

Methodology. The dam overtopping and breach analyses were accomplished using the systemized computer program HEC-1 (Dam Safety Investigation), September, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation. The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 40" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters their definition and how they were obtained for these analysis.

Parameter	Definition	Where Obtained
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel miles	From U.S.G.S. 7.5 minute topgraphic
Lca	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic
Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic

*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

3. Routing. Reservoir routing is accomplished by using Modified Plus routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation discharge relationship.

Storage in the pool area is defined by an area - elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or U.S.G.S. 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping. Using given percentages of the PMF the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

5. Dam Breach and Downstream Routing. The computer program is equipped to determine the increase in downstream flooding due to failure of the dam caused by overtopping. This is accomplished by routing both the pre-failure peak flow and the peak flow through the breach (calculated by the computer with given input assumptions) at a given point in time and determining the water depth in the downstream channel. Channel cross-sections taken from U.S.G.S. 7.5 minute topographic maps were used in the downstream flood wave routing. Pre and post failure water depths are calculated at locations where cross-sections are input.

HYDROLOGY AND HYDRAULICS ANALYSIS
DATA BASE

NAME OF DAM: Fishpond Dam

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.2 (1.05) = 23.3 inches

STATION	1	2	3
Station Description	Fishpond Dam		
Drainage Area (square miles)	0.21		
Cumulative Drainage Area (square miles)	0.21		
Adjustment of PMF for Drainage Area (%)[1]			
6 hours	117		
12 hours	127		
24 hours	136		
48 hours	143		
72 hours	145		
Snyder Hydrograph Parameters			
Zone[2]	13		
Cp[3]	0.5		
Ct[3]	1.85		
L (miles)[4]	1.09		
Lca (miles)[4]	0.43		
tp = Ct(LxLca)$^{0.3}$ hrs.	1.47		
Spillway Data			
Crest Length (ft)	30'		
Freeboard (ft)	2.9'		
Discharge Coefficient	C' = 0.95		
Exponent	N/A		

(1) Hydrometeorological Report 40 (Figure 1), U.S. Army Corps of Engineers, 1965.

(2) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's coefficients (C_p and C_t).

(3) Snyder's Coefficients.

(4) L=Length of longest water course from outlet to basin divide. L_{ca}=Length of water course from outlet to point opposite the centroid of drainage area.

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: D.A.=0.21 mi^2 Wooded-gentle slopes

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 170 ac-ft

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 227 ac-ft

ELEVATION MAXIMUM DESIGN POOL: 1047.0

ELEVATION TOP DAM: 1046.9

SPILLWAY CREST:	Emergency	Principal
a. Elevation	1044.0	1041
b. Type	Trapezoidal	Drop inlet
c. Width	30'	30" CMP
d. Length	Approximately 100 feet	200 feet
e. Location Spillover	Left abutment	Reservoir
f. Number and Type of Gates	None	1

OUTLET WORKS:

a. Type: Drop inlet
b. Location: ~~Through reservoir~~
c. Entrance inverts: Unknown
d. Exit inverts: 1009.9 feet
e. Emergency draindown facilities: 24" CMP

HYDROMETEOROLOGICAL GAUGES:

a. Type: ~~None~~
b. Location: ~~None~~
c. Records: ~~None~~

MAXIMUM NON-DAMAGING DISCHARGE: Unknown

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
```

```
    1          A1    ANALYSIS OF OVERTOPPING USING RATIOS OF PMF
    2          A2    HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF FISHPOND DAM(899)
    3          A3    RATIOS OF PMF ROUTED THROUGH THE RESERVOIR
    4          B   288     0    15     0     0     0     0     0     0     0
    5          B1    5
    6          J     1     6     1
    7          J1  .1    .2    .3    .4    .5     1
    8          K     0     1                                  1
    9          K1    INFLOW
   10          M     1     1  0.21                                       1
   11          P         22.3   117   127   131   143   145
   12          T                                        1  0.05
   13          W  1.47  0.50
   14          X -1.5   -.05   2.0
   15          K     1     2                                  1
   16          K1    ROUTE
   17          Y                          1     1
   18          Y1    1                                  -1044    -1
   19          Y4  1044  1044.5  1045  1045.5  1046  1046.5  1046.9  1048  1050  1052
   20          YS    0    30   100   180   290   420   540   750  1520  2610
   21          SS    0   1.6  13.6  46.8  99.7 165.4  254.5 381.7
   22          SE  999  1000  1010  1020  1030  1040  1050  1060
   23          SS 1044
   24          SD1046.9   3.0   1.5     5
   25          SL    5    10   360   517   583   602   692   762
   26          SV1046.9  1047 1047.5  1048  1049  1050  1055  1060
   27          K    99
```

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE= 80/04/24.
TIME= 10.55.38.

ANALYSIS OF OVERTOPPING USING RATIOS OF PMF
HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF FISHPOND DAM(899)
RATIOS OF PMF ROUTED THROUGH THE RESERVOIR

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 6 LRTIO= 1

RTIOS=	.10	.20	.30	.40	.50	1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.21	0.00	.21	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.30	117.00	127.00	131.00	143.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.47 CP= .50 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.37 AND R= 7.92 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 1.48 HOURS, CP= .50 VOL= 1.00

3.	10.	21.	32.	42.	46.	45.	41.	36.	32.
28.	24.	22.	19.	17.	15.	13.	11.	10.	9.
8.	7.	6.	5.	5.	4.	4.	3.	3.	3.
2.	2.	2.	2.	1.	1.	1.	1.	1.	1.
1.	1.	0.	0.	0.	0.				

HYDROGRAPH ROUTING

ROUTE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1044.	-1

STAGE	1044.00	1044.50	1045.00	1045.50	1046.00	1046.50	1046.90	1048.00	1050.00
1052.00									
FLOW	0.00	30.00	100.00	180.00	290.00	420.00	540.00	750.00	1520.00
2610.00									
CAPACITY=	0.	2.	14.	47.	100.	165.	255.	382.	
ELEVATION=	995.	1000.	1010.	1020.	1030.	1040.	1050.	1060.	

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
1044.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1046.9	3.0	1.5	5.

CREST LENGTH AT OR BELOW ELEVATION	5.	10.	360.	517.	583.	602.	692.	762.
	1046.9	1047.0	1047.5	1048.0	1049.0	1050.0	1055.0	1060.0

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .40	RATIO 5 .50	RATIO 6 1.00
HYDROGRAPH AT	1	.21	1	56.	113.	169.	226.	282.	564.
		(.54)		(1.60)	(3.19)	(4.79)	(6.39)	(7.98)	(15.97)
ROUTED TO	2	.21	1	48.	101.	154.	210.	265.	543.
		(.54)		(1.37)	(2.86)	(4.35)	(5.94)	(7.50)	(15.38)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1044.00	1044.00	1046.90
STORAGE	201.	201.	227.
OUTFLOW	0.	0.	540.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1044.63	0.00	207.	48.	0.00	42.25	0.00
.20	1045.01	0.00	210.	101.	0.00	42.00	0.00
.30	1045.34	0.00	213.	154.	0.00	42.00	0.00
.40	1045.64	0.00	216.	210.	0.00	41.75	0.00
.50	1045.89	0.00	218.	265.	0.00	41.75	0.00
1.00	1046.92	.02	227.	543.	.50	41.50	0.00

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME FISHPOND DAM
I.D. NUMBER
SHEET NO. 1 OF 4
BY JAL DATE 4-21-80

LOSS RATE AND BASE FLOW PARAMETERS

AS RECOMMENDED BY CORPS OF ENGINEERS BALTIMORE DISTRICT

STRTL = 1 INCH

CNSTL = 0.05 IN/HR

STRTQ = 1.5 CFS/MI^2

QRCSN = 0.05 (5% OF PEAK FLOW)

RTIOR = 2.0

ELEVATION - STORAGE CAPACITY RELATIONSHIPS

FROM USGS 7.5 MIN QUADRANGLE, AND FIELD INSPECTION DATA

ELEV.	AREA (AC)	AVERAGE AREA (AC)	DEL	Δ STORAGE (AC-FT)	Σ STORAGE
995	0				0
		0.32	5	1.60	
1000	0.64				1.60
		1.20	10	12.0	
1010	1.75				13.60
		3.32	10	33.2	
1020	4.88				46.80
		5.29	10	52.9	
1030	5.69				99.70
		6.57	10	65.7	
1040	7.44				165.40
		8.91	10	89.1	
1050	10.38				254.50
		12.72	10	127.2	
1060	15.06				381.70

(SEE CHART ON NEXT PAGE)

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CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME FISHPOND DAM
I.D. NUMBER
SHEET NO. 2 OF 4
BY JAG DATE

ELEVATION - STORAGE CAPACITY RELATIONSHIPS

E	995	1000	1030	1040	1044	1046.9	1048	1050	1052	1054	1056	1058	1060
S	0	1.60	13.60	44.90	93.70	165.40	193.20	223.20	253.5	284.7			

MAXIMUM STORAGE CAPACITY (WATER LEVEL AT LOW SPOT OF CREST) : 223 AC-FT

STORAGE CAPACITY (WATER LEVEL AT SPILLWAY CREST): 190 AC-FT

LOW SPOT OF CREST - 1046.9

EMERGENCY SPILLWAY CREST - 1044

STAGE ELEVATION

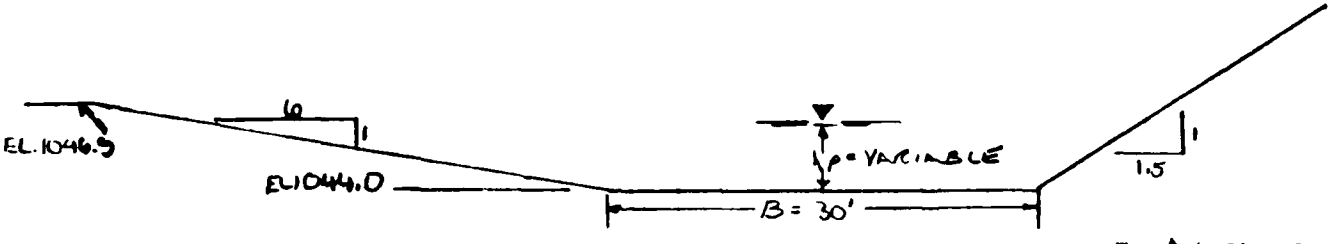
STORAGE (AC-FT)

EMERGENCY SPILLWAY SECTION

NOT TO SCALE

NOTE:

1. WEIR FLOW WILL OCCUR AT A WATER ELEVATION OF 1046.9
2. BOTTOM ELEVATION IS 1044.0
3. BOTTOM WIDTH EQUAL 30'



Z = AVERAGE SIDE SLOPE

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CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME FISHPOND DAM
I.D. NUMBER
SHEET NO. 3 OF 4
BY [illegible] DATE 4-21-80

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME FISHPOND DAM
I.D. NUMBER
SHEET NO. 4 OF 4
BY JAC DATE 4-21-80

OVERTOP PARAMETERS

TOP OF DAM ELEVATION - 1046.9
LENGTH OF CREST (EXCLUDING SPILLWAY) - 567'
COEFFICIENT OF DISCHARGE = 3.0

$L	5	10	360	517	583	602	692	767	LENGTH
$V	1046.9	1047.0	1047.5	1048.0	1049.0	1050.0	1055.0	1060.0	ELEV.

DISCHARGE RATING CURVE

TRAPEZOIDAL CURVE FROM

$$Q = 8.03 C h_v^{1/2} (h_p - h_v)[B + Z(h_p - h_v)]$$

$$h_v = \frac{3(2Z h_p + B) - (16Z^2 h_p^2 + 16ZBh_p + 9B^2)^{1/2}}{10Z}$$

$B = 30'$ $Z = 3.75$ $C = 0.95$

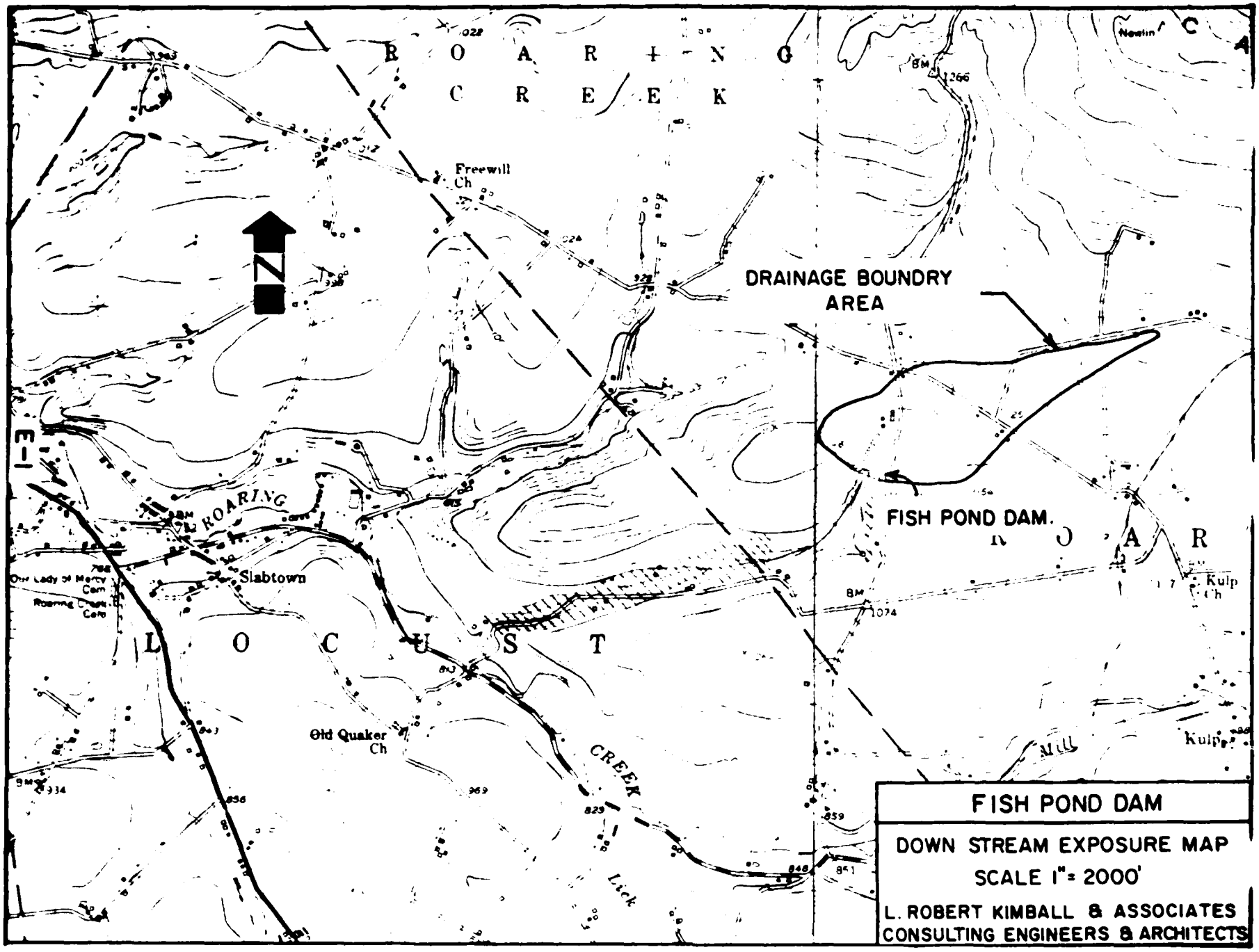
FROM: "WATER & WASTEWATER ENGINEERING" (11-14) & (11-15)
FAIR, GEYER & OKUM 1966
& "LOW DAMS" BY NATIONAL RESOURCE COMMITTEE 1938
Eq's (7) & (8)

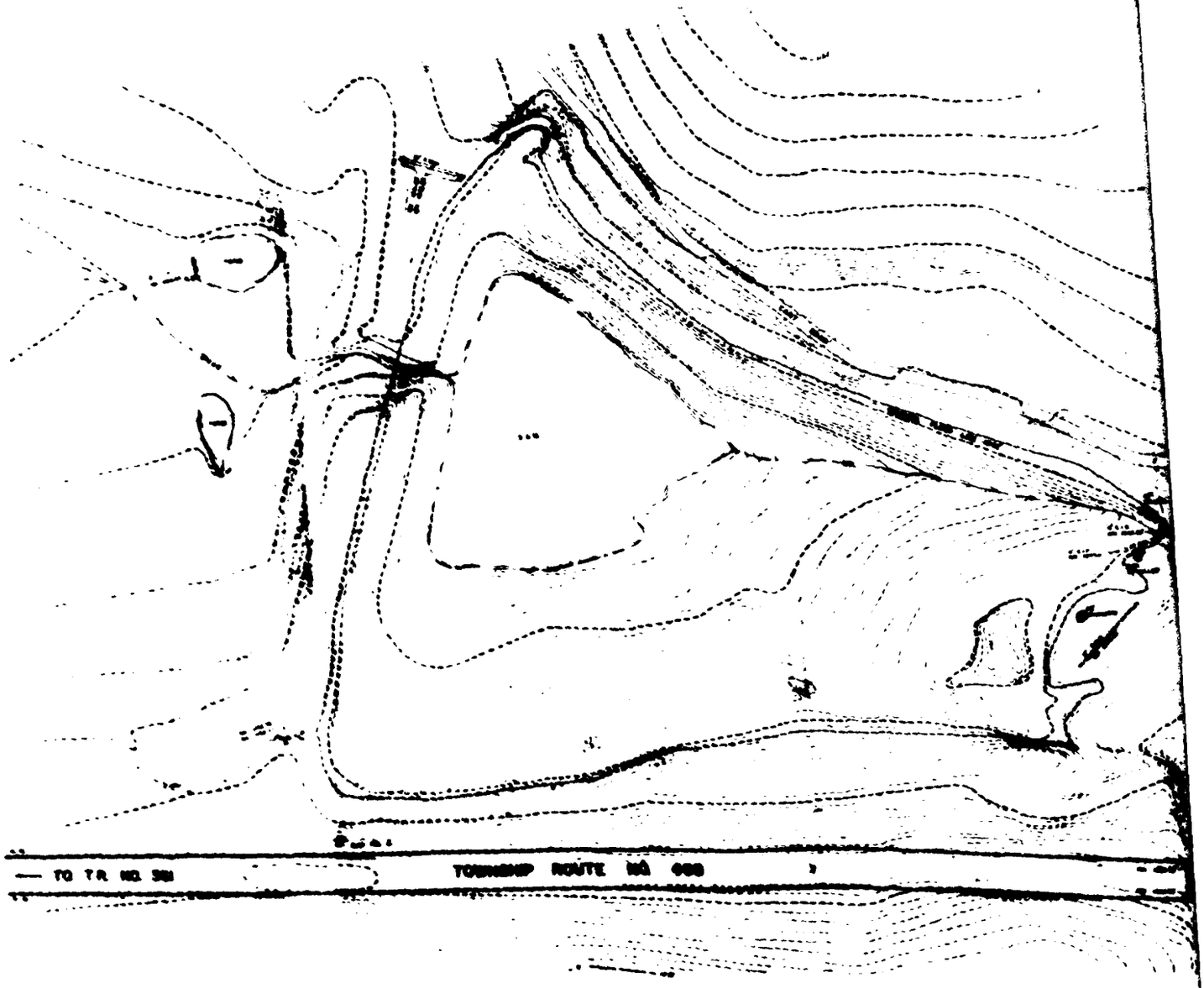
Q_{weir} $(Q) = CLh^{3/2}$ w/ $c = 3.1$ $L = 58'$

	TRAPEZOIDAL		WEIR		
ELEVATION	h_p (FT)	Q (CFS)	h_p (FT)	Q (CFS)	Q^*_{TOTAL} (CFS)
1044	0	0			0
1044.5	0.5	32			30
1045	1.0	96			100
1045.5	1.5	182			180
1046	2.0	292			290
1046.5	2.5	423			420
→ 1046.9	2.9	543	0	0	540
1048			1.1	207	750
1050			3.1	981	1520
1052			5.1	2071	2610

* VALUES ROUNDED TO NEAREST 10

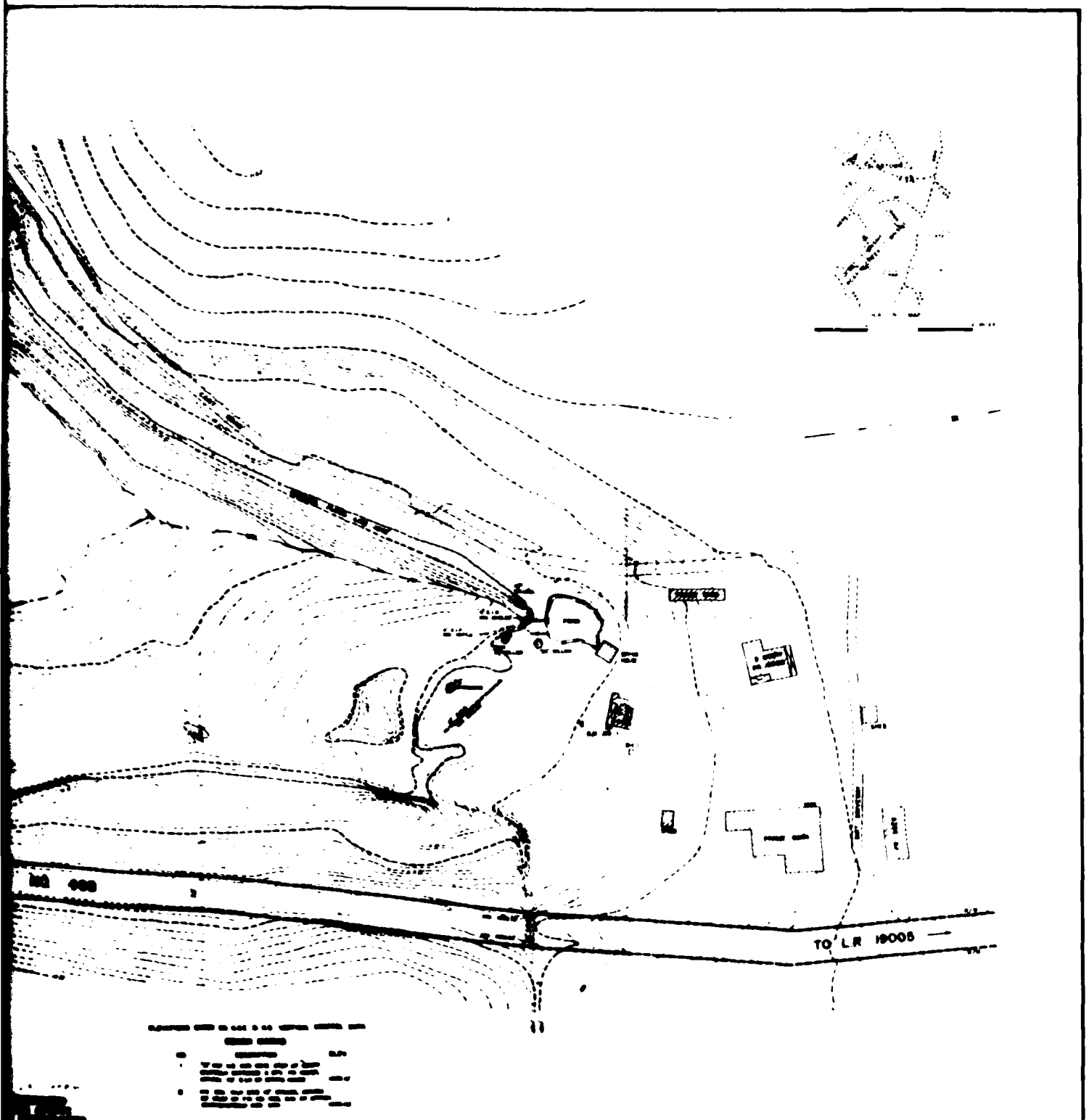
APPENDIX E
DRAWINGS


ROARING CREEK
Freewill Ch
DRAINAGE BOUNDRY AREA
FISH POND DAM.
ROARING
Slabtown
Our Lady of Mercy Cem
Roaring Creek Cem
LOCUST
Old Quaker Ch
CREEK
Lick
Kulp Ch
Kulp
Mill
BM 1266
BM 1074
BM 934
N
I-81
FISH POND DAM
DOWN STREAM EXPOSURE MAP
SCALE 1"= 2000'
L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS



PROPOSED RESTORATION OF FISHING RIVER, INC.

1



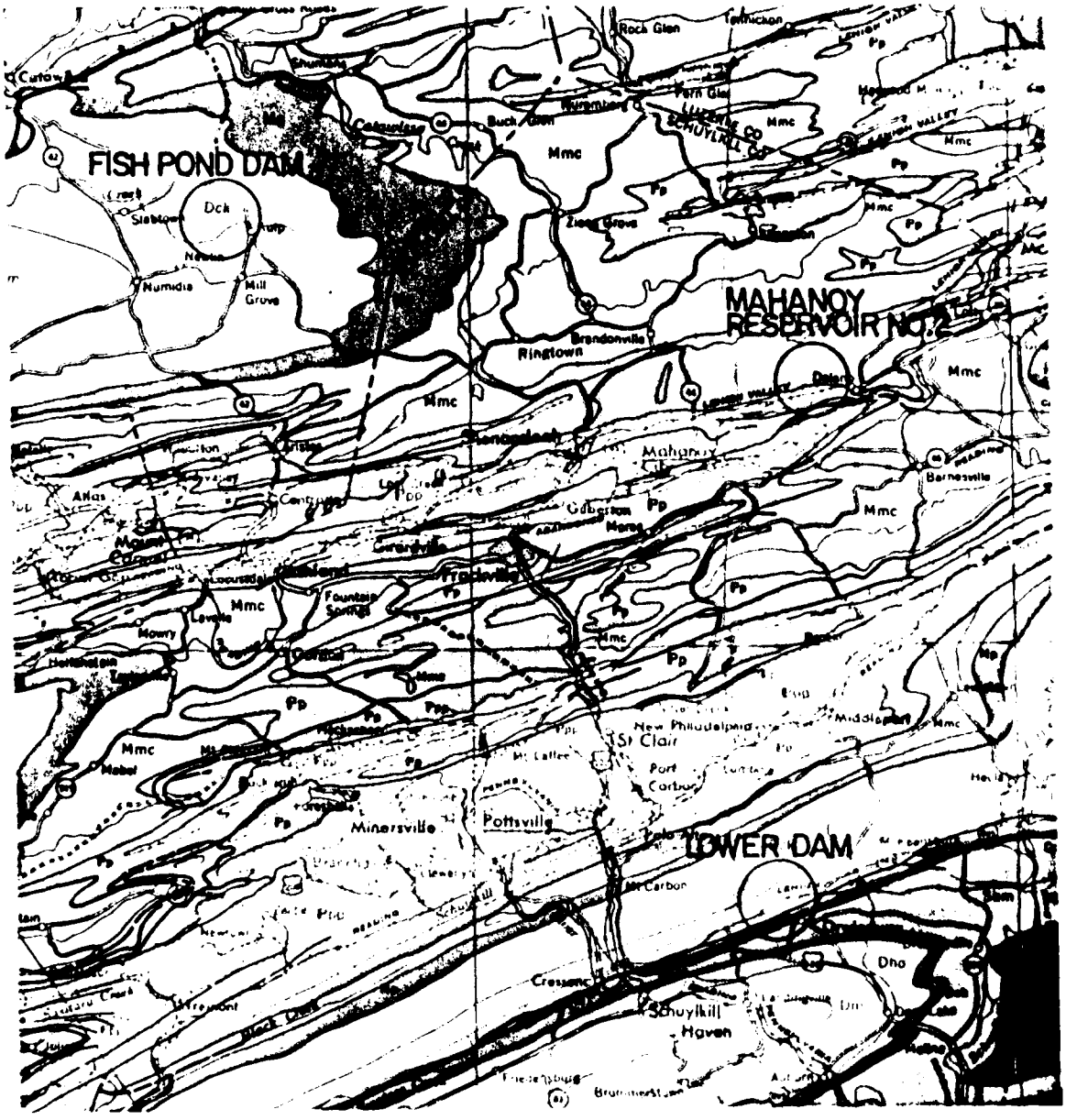
L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

APPENDIX F
GEOLOGY

General Geology

Fishpond Dam lies within the Appalachian Mountain Section of the Valley and Ridge Physiographic Province. This area is characterized by overturned and assymetric folds, local shearing and large, low-angle thrust faults. There is some minor faulting indicated a few miles to the west and also to the northeast of the dam.

The bedrock underlying the dam consists of the Devonian aged Catskill formation. This is a complex unit consisting of sandstones, siltstones, shales and conglomerates. The usually well developed beds range in thickness from less than one foot to over fifteen feet. The well developed and closely spaced joints in the siltstones and shales are steeply dipping and form blocky or platy patterns. The formation is moderately resistant to weathering, except for the shales, which disintegrate rapidly. The foundation stability for heavy structures is good if excavated to sound material and the shales and siltstones are kept water free.



GEOLOGICAL MAP OF THE AREA AROUND FISH POND DAM, LOWER DAM AND MAHANOY DAM NO. 2.

Pp — Pottsville Group

Mc — Mauch Chunk Formation

SCALE 1 : 250,000